Windows NT and the Internet

J. Allard

jallard@microsoft.com

Kerry Schwartz

kerrys@microsoft.com

Agenda (part 1)

- Overview of the Internet
  - History
  - Infrastructure
  - Applications
  - Issues facing the Internet
- Microsoft's Role in the Internet
- Client-side Internet Perspective & Demo
- Questions & Answers

Agenda (part 2)

- Server-side Internet Perspective
- Case-study: Microsoft
- Demo: Building an NT-based Server
- Demo: Internet Publishing w/ Internet Assistant
- Internet 2000
- Questions & Answers

What is the Internet?

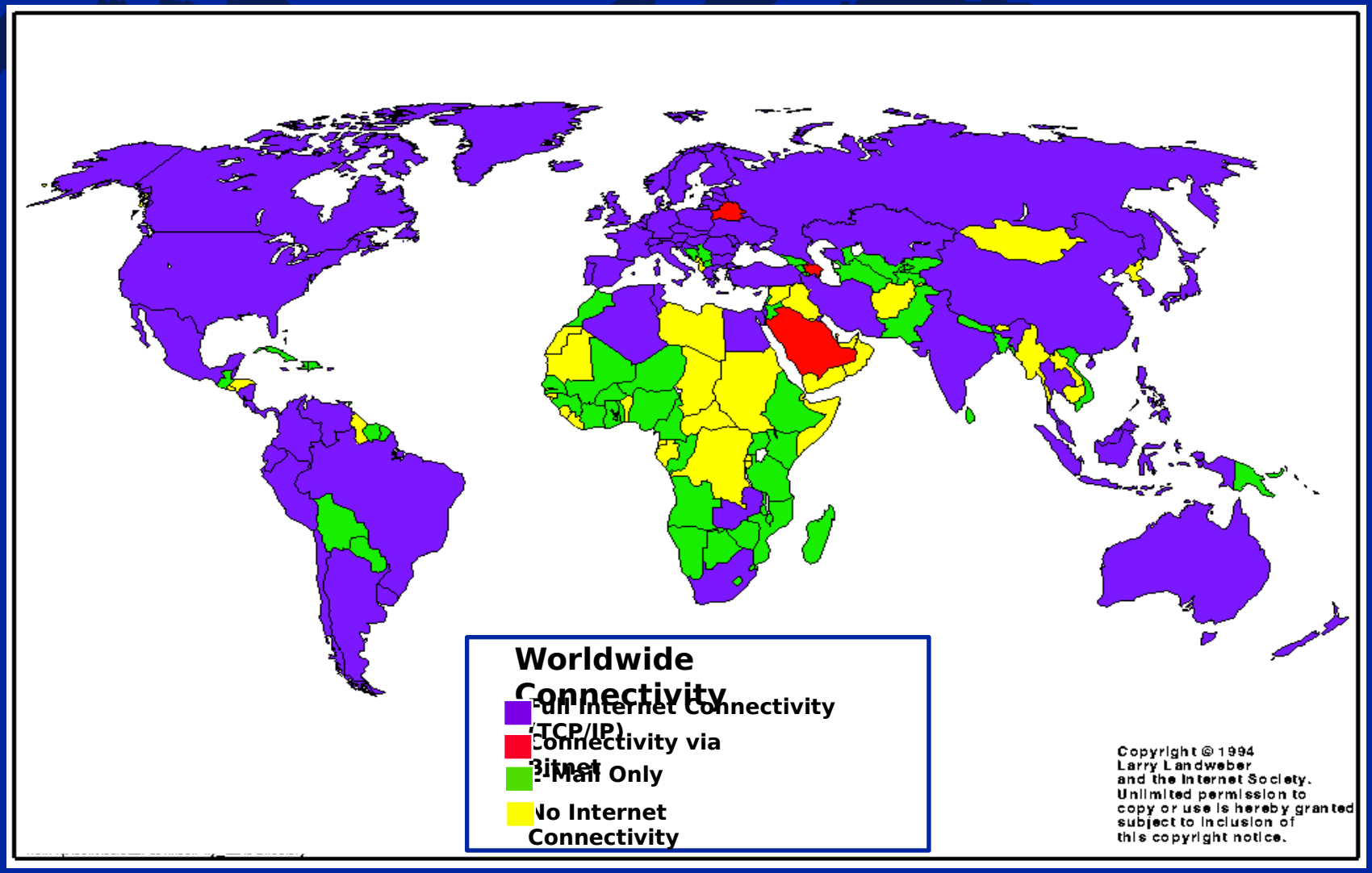
- Worldwide Community Network built on 3 components:

- **Infrastructure:** Worldwide Network of IP-based Networks
- **Users:** Dial-up (individuals), Organizational (corporate, academic)
- **Applications:** File transfer, E-mail, Hypertext information systems

The Infrastructure

- Over 47,000 networks
  - 27% commercial
  - 25% academic
  - 5% government
  - 2% Internet providers
- Over 4,850,000 computers
- 159 countries have some Internet connectivity (e-mail access)
- 90 countries have full Internet connectivity

Infrastructure: Worldwide Connectivity



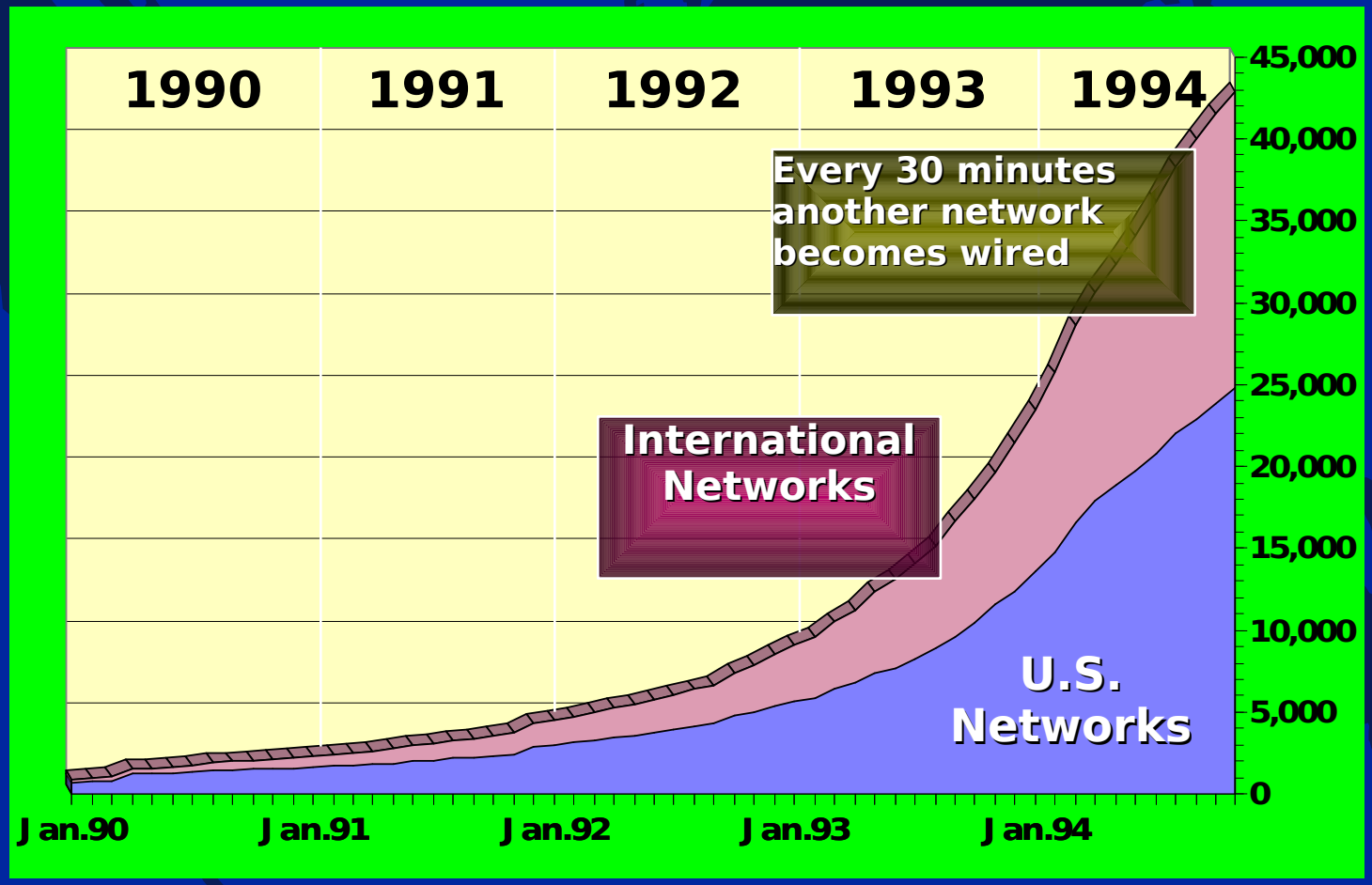
Infrastructure: Who owns the Internet?

- No one - ownership is distributed
- Internet Society - Disseminates information on Internet issues, growth, and standards activities
- Internet Architecture Board (IAB) - votes on standards (RFCs)
- Internet Engineering Task Force (IETF) - meets to solve technical problems, authors RFCs
- InterNIC - assigns Internet addresses and top-level domain names

Infrastructure: A Quick History

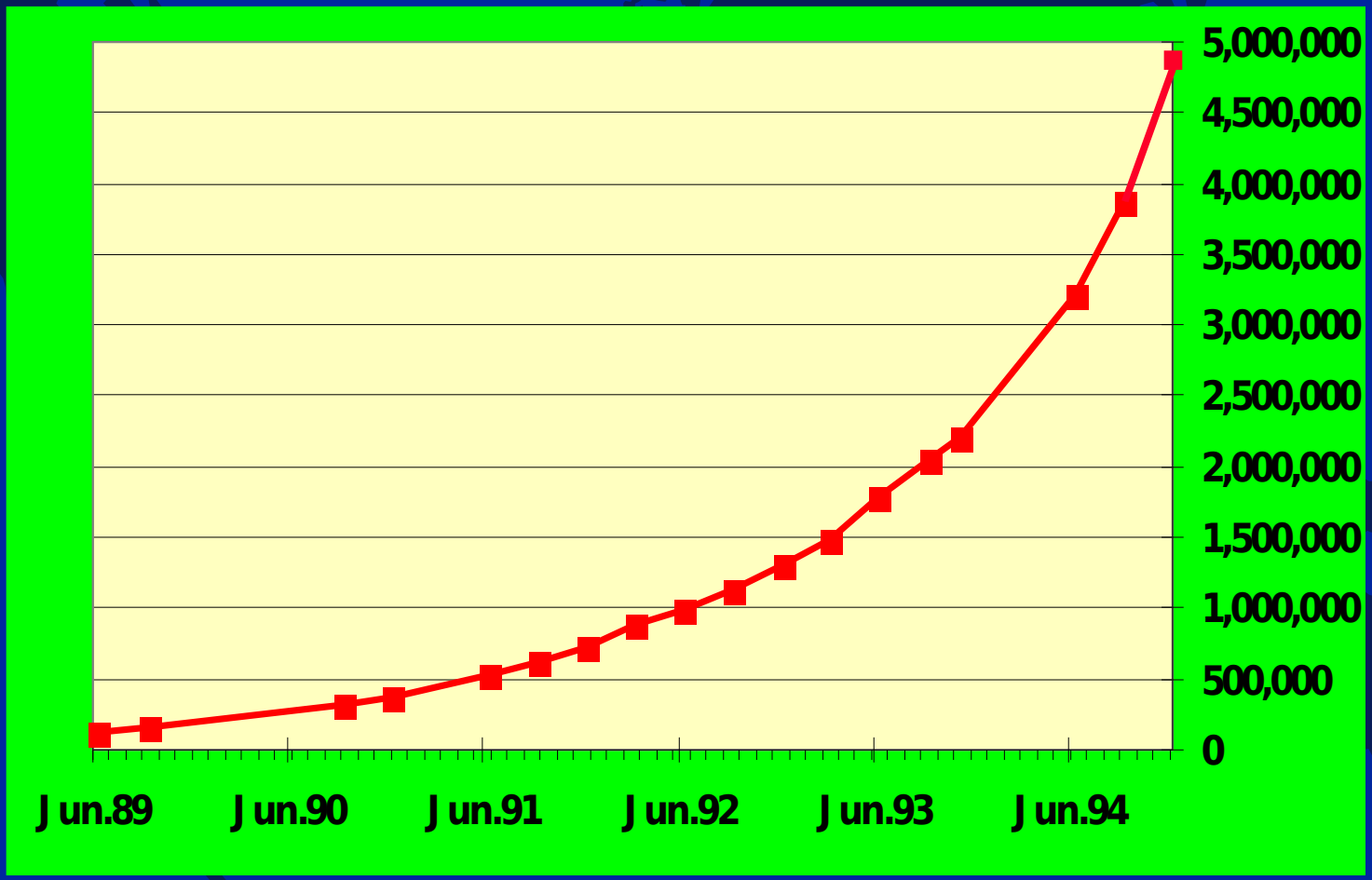
- **1970s** - created as the ARPAnet, for US military research
- **1980s** - NSFNet was built, adding Universities & supercomputer centers
- **1990s** - commercial networks added, CIX created. Boom of individual Internet Service Providers
- *Mostly built and funded by the US government, for research, education, and other non-commercial uses*

Infrastructure: Network Growth



Source: ftp://nic.merit.edu/statistics/nsfnet

Infrastructure: End System Growth



Source: ftp://nic.merit.edu/statistics/nsfnet

Infrastructure: Technologies

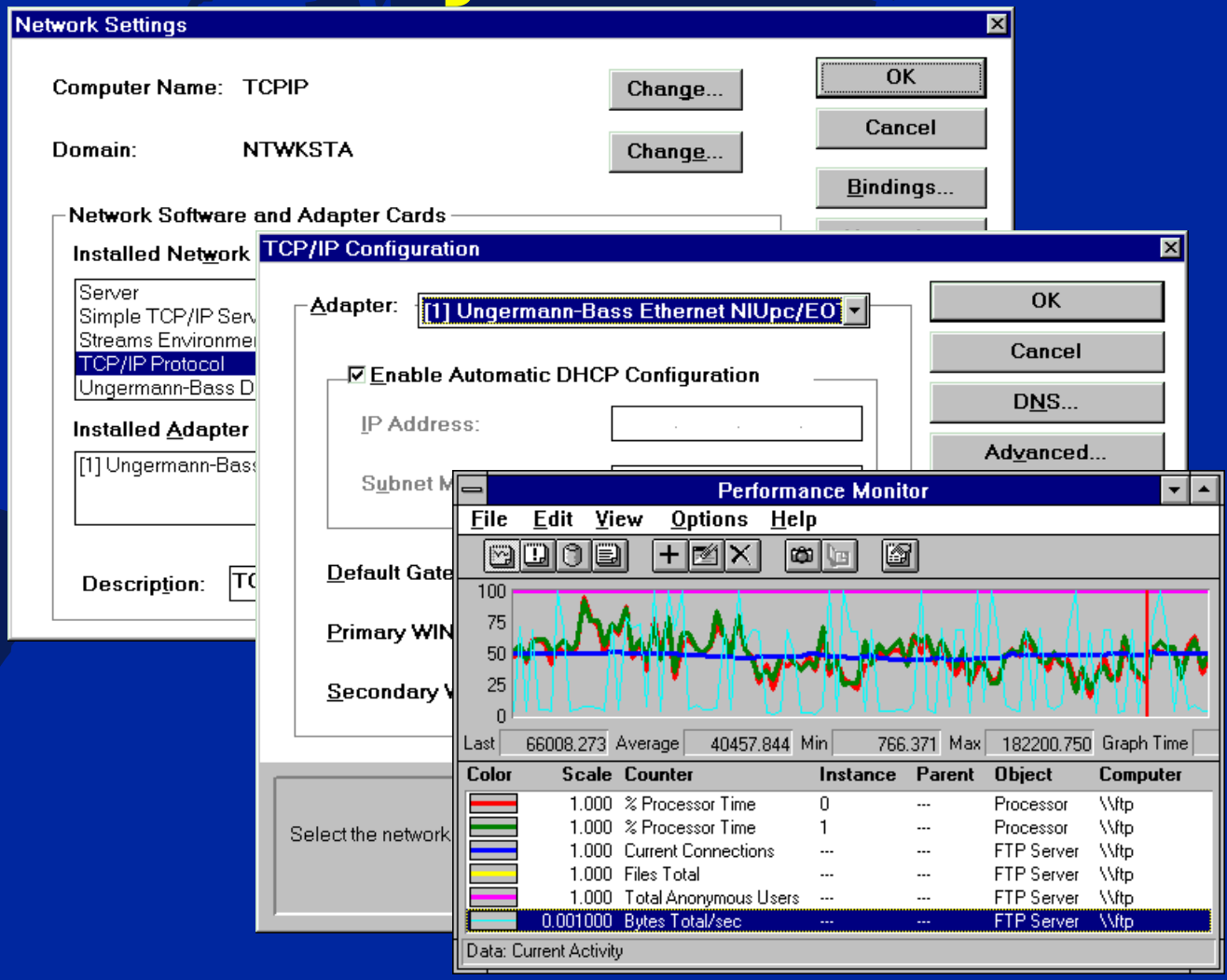
- TCP/IP: The low-level protocol of the Internet. End systems, routers, and servers all support the base TCP/IP protocols
- Routers: IP routers exchange knowledge of all connected networks
- DNS: Simple directory for application and mail server name lookups

Infrastructure: Technologies

- SLIP/PPP: Standards for connecting end systems via modem/ISDN.
- Windows Sockets: Windows-based, binary-compatible API for network application development (Mosaic leverages this facility)
- Application/mail servers: Independently owned and managed

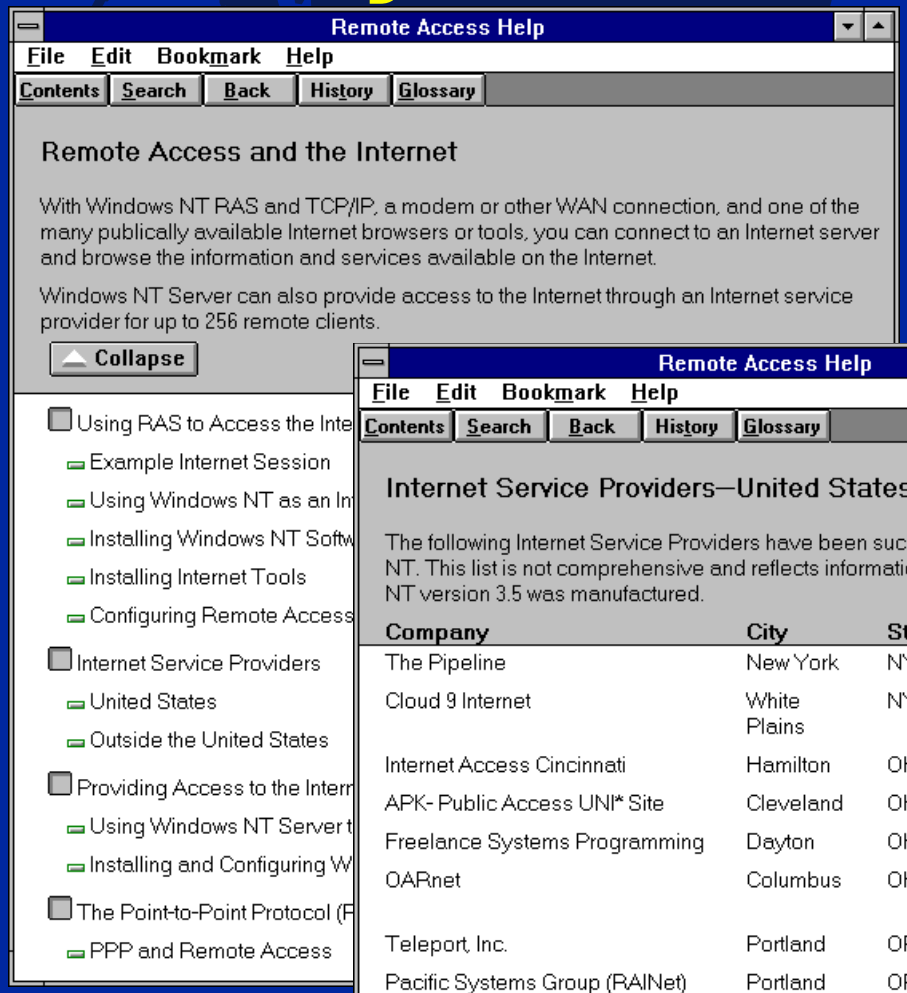
Infrastructure: Windows NT is Ready

- TCP/IP, Windows Sockets and FTP support included in the base OS serves as a foundation for Internet connectivit



Infrastructure: Windows NT is Ready

- Online help for users connecting to the Internet using SLIP or PPP over modems, X.25, or ISDN
- Compatibility listing with 100's of Internet providers and their numbers



Users: The Internet User Community

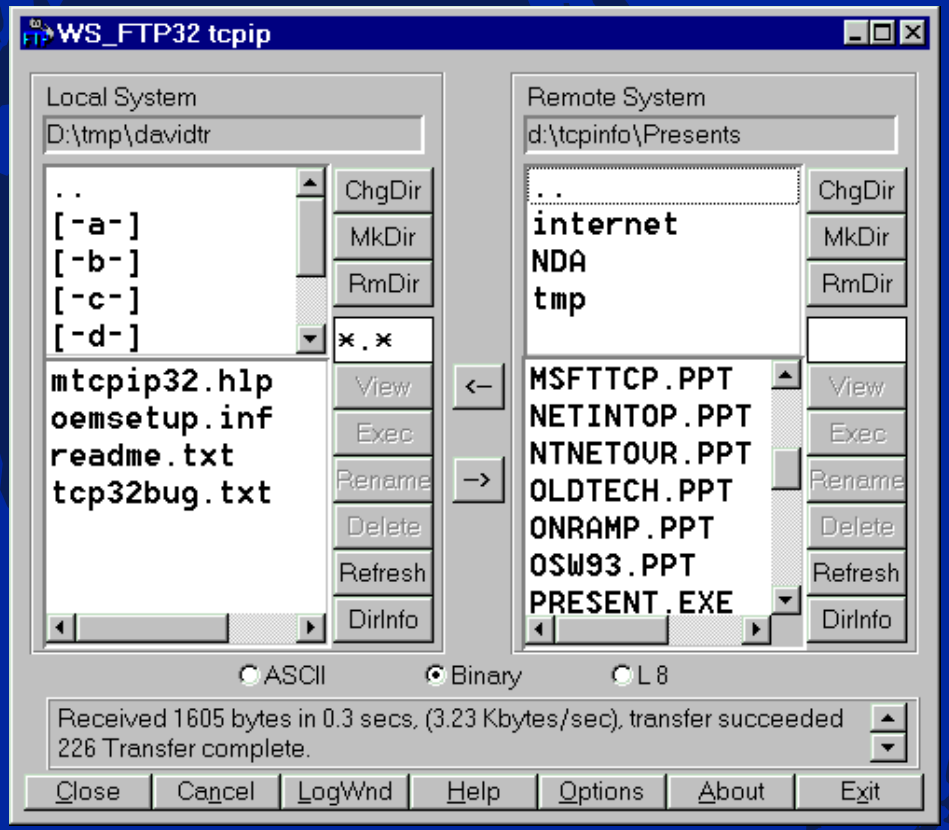
- Estimated 40 Million users (e-mail is lowest common denominator)
- Many “degrees” of access:
  - e-mail via mail gateways on private/organizational networks
  - access via on-line service (AOL, Compuserve, etc.)
  - Internet Service Provider (full SLIP/PPP access)
  - Leased connection to organization LAN (routed IP)

Applications: Common services available on the Internet (today)

- E-mail: SMTP, POP, MIME
- NetNews: bulletin board discussions (NNTP)
- FTP/Gopher: bulk data/file transfer
- World-Wide-Web: Hyper-media information publishing system w/ simple forms
- Universal Resource Locators (URL's): uniform naming convention to describe Internet resources

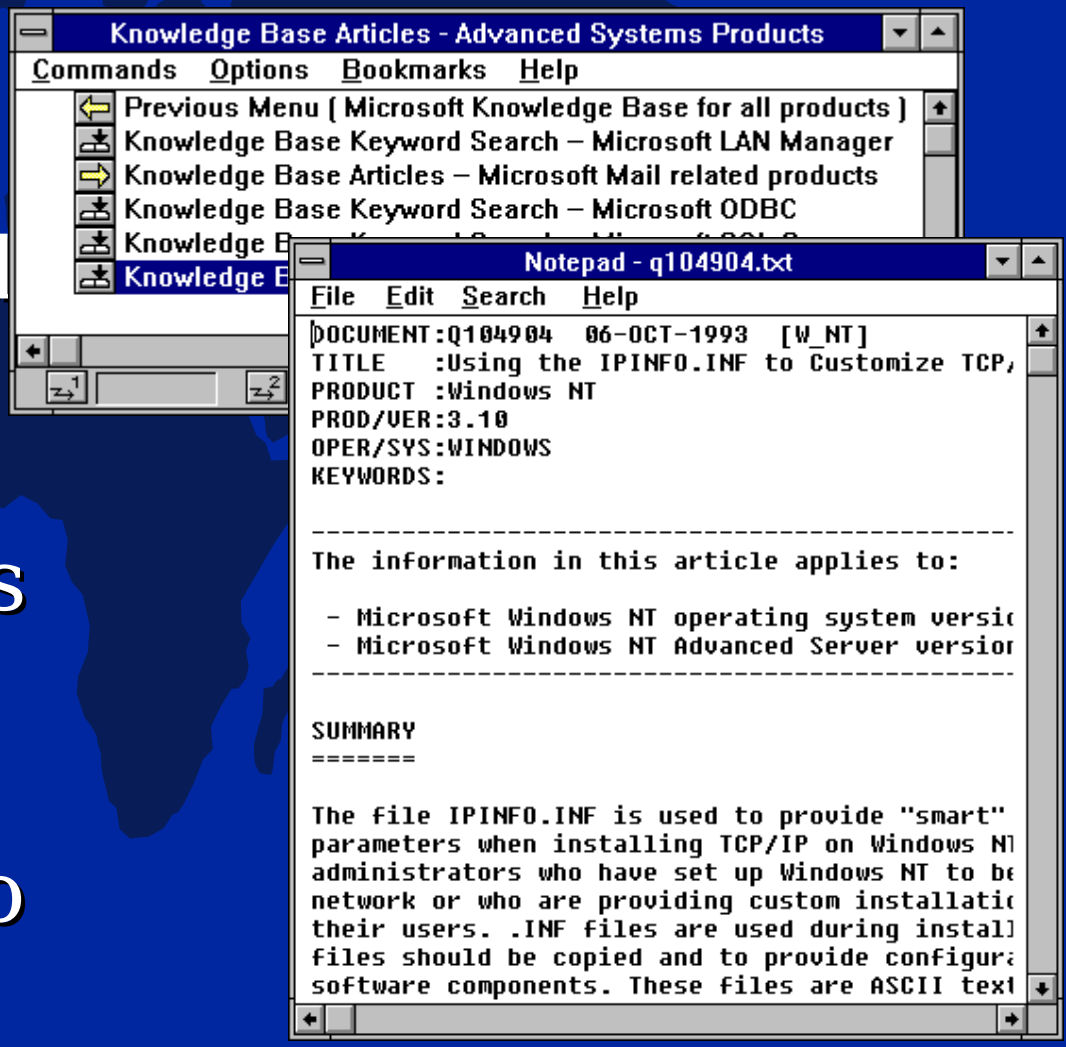
Applications: FTP

- The Internet's courier service
- Available on all OS platforms, thus the least-common-denominator for bulk data transfer



Applications: Gopher

- Friendlier than FTP by allowing descriptions and richer filetyping
- Easy to implement: bolts onto the local filesystem
- Permits linking to other gopher servers



Applications: World-Wide-Web

- Designed with rich documents in mind
- Extensive use of URLs or “links” to join relevant documents across servers

Issues facing the Internet Today

- Security
  - Lack of authentication limits commercial viability of secure information exchange
  - Lack of encryption standards limits ability to conduct secure transactions between buyers and sellers
  - Decentralized nature of the Internet presents a “playground” for network vandals and criminals to explore
  - Many products/protocols in use developed in the public domain by students contain major bugs and security holes. Source availability worsens this issue by permitting others to locate and exploit these weaknesses easily

Issues facing the Internet Today

- Authoring: Web markup standard (HTML) designed with simplicity in mind (can author using vi), but commercial support is lacking. Authoring serious content can be hard to manage.
- Scale: Routing table explosion, DNS stress, IP address allocation
- Lack of universal directory: Near-impossible for a novice to find the information, users, or services they seek

Microsoft's Role: Philosophy

Embrace, Extend, Innovate

- **Embrace:** Incorporate Internet functionality in base products (TCP/IP, HTML, SMTP)
- **Extend:** Grow existing standards to meet customer needs (Windows Sockets, DHCP, Win32 Internet Extensions)
- **Innovate:** Build value on foundation technologies (Web browsing with Internet Assistant,

Microsoft's Role: Standards

- Charter member of the Internet Society
- Active in the IETF, ATM Forum, W3C, and Windows Sockets Consortium
- To date, have assisted in the development of several key standards: DHCP, PPP, IPng, Windows Sockets, ATM

Microsoft's Role: Products

- TCP/IP-32 for Windows for Workgroups
- Windows NT 3.5 Workstation
- Windows NT 3.5 Server
- Windows NT 3.5 Resource Kit
- Internet Assistant for Word for Windows

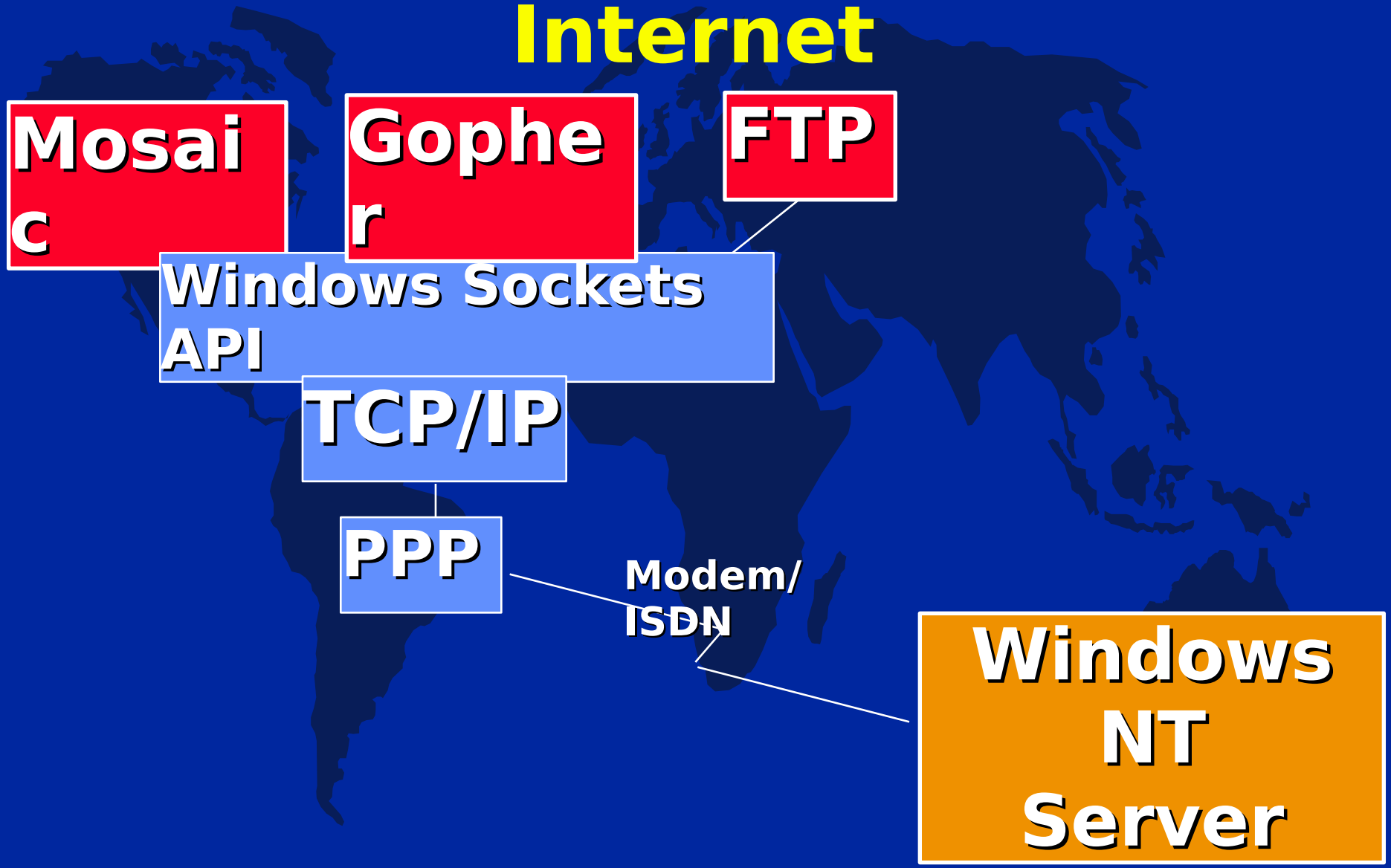
Microsoft's Role: Futures

- Microsoft Network (UUNet)
- Exchange (SMTP/MIME support)
- Windows 95
- Internet Shortcuts
- MIME integration
- Internet Extensions for Win32

Client Perspective on the Internet

- Key incentives for connecting: collaboration and research (cheap, digital courier service)
- Primary applications (today): e-mail, file transfer
- The Web has expanded interest through simple interface and rich document publishing
- Early indexing technologies (Lycos, WebCrawler, etc..) have enhanced the ability to locate resources based on

Demo: Client Access to the Internet



Key Internet Resources

- Microsoft's Internet sites:
  - ***ftp://ftp.microsoft.com***
  - ***gopher://gopher.microsoft.com***
  - ***http://www.microsoft.com***
- Public domain Windows Sockets tools are available on:
  - ***ftp://sunsite.unc.edu/pub/micro/pc-stuff/ms-windows/winsock***
  - ***ftp://ftp.cica.indiana.edu/pub/pc/win3/winsock***
- RFCs found at: ***ftp://ds.internic.net***

Questions and Answers

Agenda (part 2)

- Server-side Internet Perspective
- Case-study: Microsoft
- Demo: Building an NT-based Server
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Server Perspective on the Internet

- Key incentives for connecting: collaboration (inter-org/customer) and information dissemination
- Primary applications (today): e-mail, file transfer (FTP, Gopher)
- The Web has expanded interest for rich document publishing (product/sales information) and simple multimedia

Business Opportunities (today)

- Sales/Product Information
- Customer Support
- Software updates
- Customer feedback, surveys
- Product samples (e.g., articles, chapters, audio)
- Expanded market presence

Business Opportunities (emerging)

- Commerce
  - Online ordering
  - Real-time information/software acquisition & licensing
- Secure transactions
- New applications such as audio/video conferencing, shared whiteboards, etc.
- Inter/Intra-enterprise connectivity

Internet Platforms

- Historically, servers based on UNIX
  - Most applications developed in academic/research community over the last 10 years, thus Unix
  - Generally unsupported, putting the maintenance onus on the administrator to keep the server up-to-date and secure (security holes abound)
  - Requires a fair amount of expertise to install and manage (often requiring compilation and/or adaptation to environment)
- Microsoft Windows NT
  - The first big step in PC/Internet convergence
  - Microsoft & third parties developing commercial Internet services
  - Permitting lower cost of entry, easier management and richer solutions for a broader audience

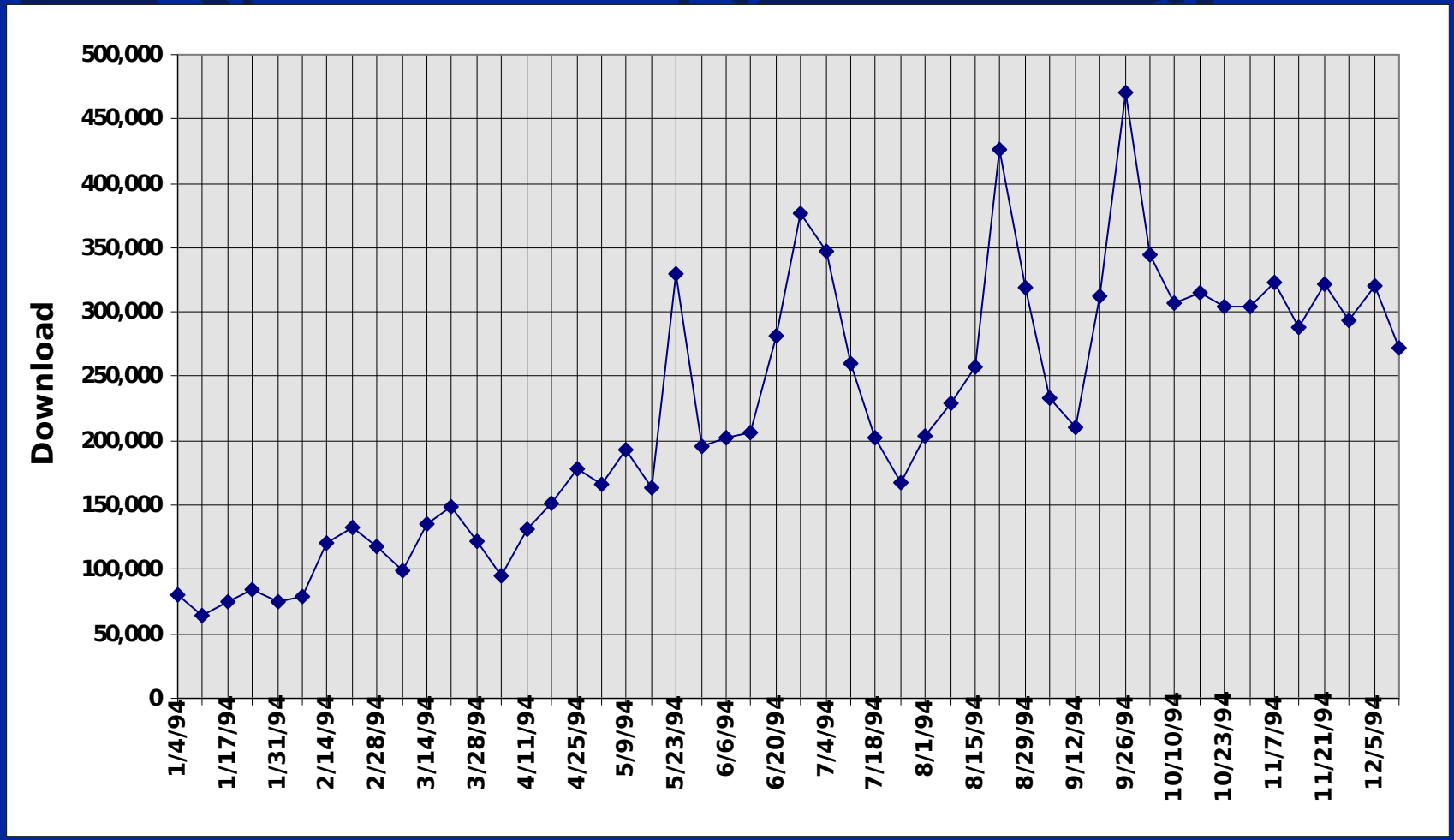
Case Study: Microsoft

- A successful effort to improve customer satisfaction/support and defray support costs
- FTP server on-line since 1993
- Gopher & WWW servers added in late ‘94, upgrade to T3 capacity (45MB/Sec)
- Servers each running on dual-processor Pentium machines
- All systems running stock Windows NT 3.5 Server and Windows NT

ftp.microsoft.com

- Over *1 million downloads/month*
- Average: 200 simultaneous connections
- Contents:
  - Product updates, betas, add-ons
  - Product documentation, help files
  - Technical white papers, conference presentations
  - Company financials

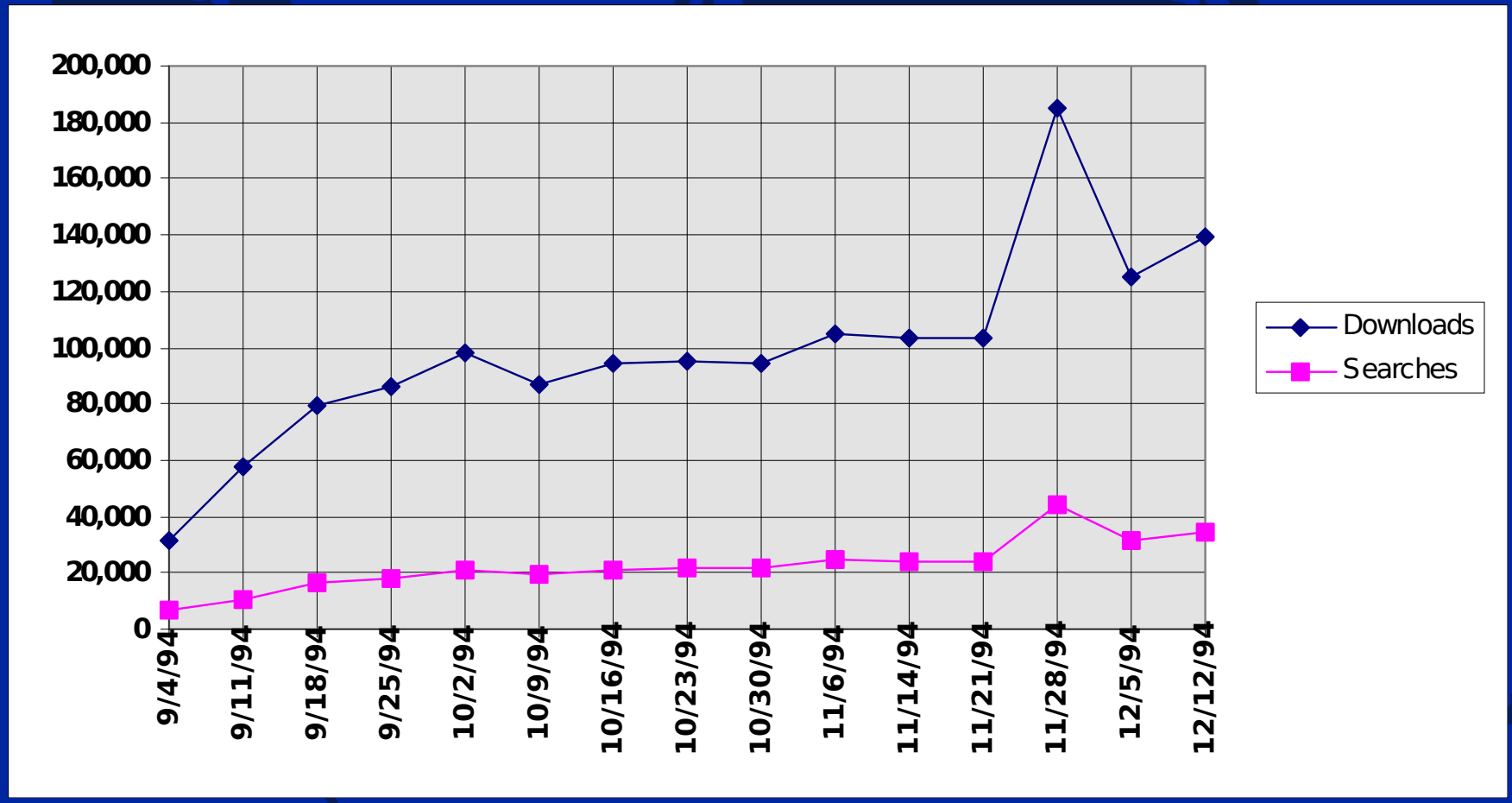
ftp.microsoft.com Statistics



gopher.microsoft.com

- Over 1/2 million requests/month
- Contents:
  - Product Support KnowledgeBase (Searchable)
  - Software Library
  - Developer Network information

gopher.microsoft.com Statistics



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- Over 1 million pages downloaded/month
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  - Sales, product and ordering information
  - Feedback forms
  - What's new at Microsoft

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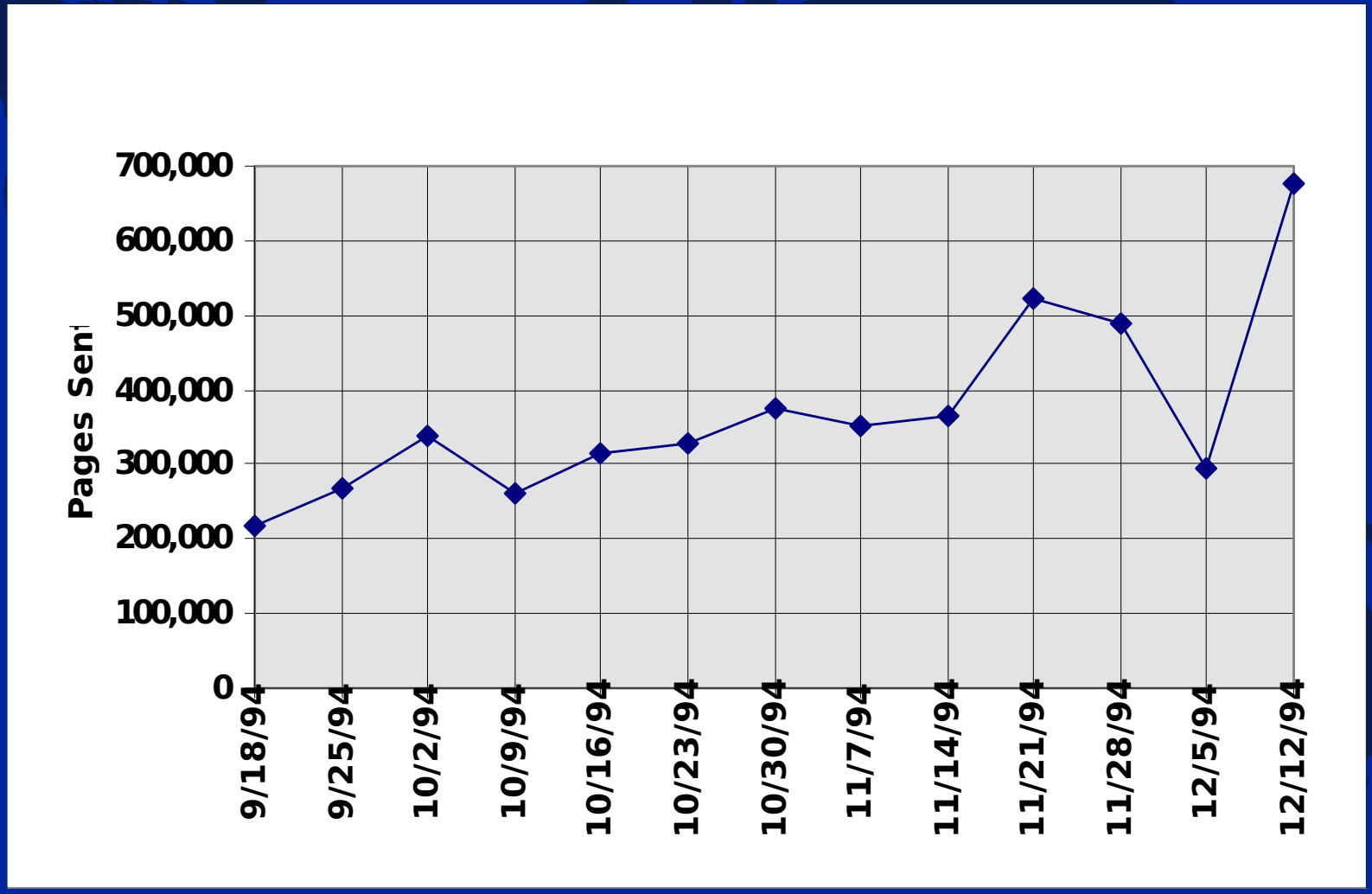

Case Study - UCLA (Video)

Demo: Building a Windows NT Internet Server

1. Install Windows NT Server 3.5
2. Configure TCP/IP
3. Configure FTP Server
4. Add Resource Kit
   - Web server
   - Gopher server
   - WAIS server & WAIS Toolkit
   - DNS Server
5. Just add content...

Demo: Authoring Web Pages with Internet Assistant

- Author/import document
- Autoformat, SpellCheck, GrammarCheck
- Convert to HTML
- Add hyperlinks
- Add image(s)
- Save to Web Server

Demo: Windows 95, Windows NT Server

Internet 2000: What's next?

- Near-term: Internet Shortcuts, Internet Extensions for Win32, Exchange, Windows 95 base protocol support, tons of 3rd party Web and mail products
- Mid-term: Explosion of dialin/ISDN consumer access, enhanced Internet publishing, simple commerce, basic conferencing
- Long-term: Ubiquitous connectivity (wired and wireless), real-time collaboration, big bandwidth, Windows applications

Summary: Microsoft's Internet Strategy

Embrace, Extend, Innovate

- Microsoft has *embraced* the Internet by incorporating core Internet technologies across our product family. These facilities will be leveraged by Microsoft and third parties to bring quality products to Windows users

Summary: Microsoft's Internet Strategy

Embrace, Extend, Innovate

- Microsoft will *extend* the capabilities of the Internet by working with standards groups and by advancing the PC/Internet convergence
- Making it easier to get users and businesses wired will advance the development of next generation tools & applications through Microsoft and ISVs

Summary: Microsoft's Internet Strategy

Embrace, Extend, Innovate

- The technology foundation in Windows NT 3.5 and Windows 95 will provide the basis for *innovation* in future Microsoft products (come back next year, and we'll tell you more...)

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Questions and Answers